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*Appeal*  
*Brief*  
8-28-03  
*L. Spruell*

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of: NUSSER, DENNIS Art Unit: 3307  
Serial No.: 08/612,969 Examiner: Nguyen, A.  
Filing Date: March 5, 1996  
For: INPUT APPARATUS FOR PEOPLE HAVING SMALL HANDS

APPEAL BRIEF

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Commissioner of Patents  
PO Box 1450  
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Sir:

This is an Appeal Brief under 37 C.F.R. § 1.192 in connection with the final rejection of claims 1-6, 9-19, 21-25, 27 and 28, in the Final Office Action mailed October 18, 2002, and an Advisory Action mailed February 12, 2003. A Notice of Appeal was filed on March 4, 2003. Each of the topics required by 37 C.F.R. § 1.192 is presented herewith and is labeled accordingly.

A Petition for Extension of Time Under 37 C.F.R. § 1.136(a) and a check for \$465 is being filed herewith to extend the response period to August 4, 2003. The Commissioner is hereby authorized to charge any additional fees required by this action, or credit any overpayment, to Deposit Account No. 16-1435. A duplicate of this sheet enclosed for that purpose.

Real Party in Interest

The real party in interest in this patent application is the inventor, Dennis W. Nusser, of Fort Lauderdale, Florida (hereinafter "Appellant").

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### **Related Appeals and Interferences**

The Appellant and the Appellant's legal representative know of no related appeals or interferences that will directly affect, will be directly affected by, or have a bearing on, the Board's decision in this appeal.

### **Status of Claims**

Claims 1-6, 9-19, 21-25, 27, and 28 stand finally rejected under 35 U.S.C. § 103(a) and are the substance of this appeal. This appeal concerns a Continued Prosecution Application (CPA) filed on February 14, 2002. Claims 7 and 8 were canceled by the Appellant in a preliminary amendment filed with the CPA on February 14, 2002. Claims 20 and 26 were canceled by the Appellant in the parent application.

In addition to the CPA filed on February 14, 2002, CPAs were filed on January 16, 2001, on February 28, 2000, and on December 7, 1998. The rejection of claims 24 and 28, under 35 U.S.C. § 112, first paragraph, stated in the Office Action mailed on December 23, 1998, was never referred to after the filing of Appellant's June 22, 1999 response which addressed the rejection. It is presumed for the purposes of appeal that the rejection of these claims under 35 U.S.C. § 112, first paragraph, has been withdrawn.

Thus, the final rejection of claims 1-6, 9-19, 21-25, 27, and 28 under 35 U.S.C. § 103(a) is appealed.

### **Status of Amendments**

In response to the final rejection mailed on October 18, 2002, Appellant submitted an amendment pursuant to 37 C.F.R. § 1.116 on January 21, 2003, which sought to amend claims 1, 6, and 23. Additionally, arguments were presented addressing the pending rejection of the claims under 35 U.S.C. § 103(a). In an advisory action, dated February 12, 2003, the Examiner indicated that the claim amendments would be entered. Accordingly, the claims shown in the Appendix reflect the amendment entered by the Examiner in response to the Amendment and Reply filed January 21, 2003.

### **Summary of the Invention**

The present invention recognizes that with the advent of computers, there are an increasing number of children and other non-adults who use keyboard input devices, who have difficulty using full size keyboards due to the spacing and location of the keys. The present invention further recognizes that standard computer keyboards are ergonomically incorrect for children or adults with hand sizes (finger lengths) smaller than the average adult. For example, a child cannot touch type using standard techniques as their fingers cannot span the distance between the "t" and the "q" keys on a standard ANSI sized "qwerty" keyboard.

As such, it was desirable to have an input device which accommodates users who have small hands. The desirability of the keyboards of the present invention is illustrated by their commercial availability and success as the trademarked LittleFingers® Keyboard. See, e.g. [www.datadesktech.com](http://www.datadesktech.com). Educators have also

Accordingly, the present invention relates to an input apparatus, such as a keyboard, scaled for non-adult humans and adult humans having smaller than average hands. The input apparatus provides fixed keys, with a key spacing smaller than the ANSI/HFS (American National Standards Institute Human Factors Society) standard 100-1988 spacing, to allow children as young as 3 and 4 years old to enter data into a computer using standard touch typing techniques.

Thus, the present invention provides an input apparatus, comprising a plurality of keys sufficient for providing a plurality of input signals to a central processing unit, with a key size and spacing between 60 and 86% of the ANSI/NFS standard (Specification at page 5, lines 9-14; p. 9, lines 28-36). The ANSI/HFS 100-1988 standard for key spacing is a horizontal center line distance (the distance from the center line of one key to the center line of a horizontally adjacent key) of 18-19 millimeters (mm), and a vertical center line distance (the distance from the center line of one key to the center line of a vertically adjacent key) of 18 to 21 mm (Specification at page 3, lines 25-37). In contrast, the present invention describes a fixed key input apparatus comprising a plurality of keys to generate input signals corresponding to each letter of an alphabet wherein the keys are arranged with a horizontal key spacing, centerline to centerline, of 10.8 to 16.4 millimeters (Specification at page 8 line 33 to page 9, line 2), a vertical key

spacing, centerline to centerline, of 10.8 to 18.0 millimeters (Specification at page 9, lines 3 to 13), an individual key width of 7.2 to 13 millimeters (Specification at page 9, lines 14-20), an individual key depth of 7.2 to 15 millimeters (Specification at page 9, lines 21-27), and a keystroke travel range of about 0.9 to 6 millimeters, and more preferably a range of about 2 to 4 mm, and even more preferably a range of about 1.2 to 3.44 mm (Specification at page 10, lines 22-28, describing a keystroke travel range of 60% of the ANSI standard of at least 1.5 mm), whereby the fixed key input apparatus is sized accordingly for use by a person with smaller than average hands.

The input apparatus may include keys for each letter of the alphabet (Specification at page 5, lines 21-28) and each Arabic numeral (Specification at page 6, lines 1-7). Additionally, keys may be provided for generating input signals corresponding to a function to be undertaken such as: shift, return, control, alt, tab, caps lock, home, end, page up, page down, clear, scroll lock, up, down, left, right, backspace, delete, number lock (num lock), enter, print screen, pause, escape (esc), option, or combinations thereof; and also for generating input signals corresponding to symbols wherein the symbols comprise: ` , ~ , ! , @ , # , \$ , % , ^ , & , \* , ( , ) , \_ , - , + , = , \ , | , ] , } , { , [ , : , ; , " , ' , , , < , > , . , ? , or / (Figure 3; Specification at page 2, lines 10 to 20, and at page 6, line 7 to page 7, line 5). The keys of each row may be offset, to facilitate the ability of the user to enter data by touch typing, in a manner as is generally described by the ANSI/HFS 100-1988 standard (Specification at page 5, lines 28-33).

In an embodiment, the input apparatus of the present invention may comprise at least 58 keys arranged in the standard "qwerty" arrangement seen on conventional keyboards and typewriters; this arrangement may include the ability to select different input functions by use of a function (e.g. "shift") key. Also, this arrangement may include additional function keys, such as function keys identified as F#, where # is an Arabic numeral, or number keys located apart from the alphanumeric keys (Specification at page 6, line 21 to page 7, line 5; Figures 2 and 3).

### **Issues**

The Examiner finally rejected claims 1-6, 9-19, 21-25, 27 and 28 as being unpatentable under 35 U.S.C. 103(a) over Herzog et al. (U.S. Patent No. 4,669,903) in

view of Wang (U.S. Patent No. 5,334,976) and Christopher et al. (U.S. Patent No. 4,075,679).

The issue presented for consideration in this appeal is whether the Examiner erred in rejecting claims 1-6, 9-19, 21-25, 27 and 28 under 35 U.S.C. 103(a) as being unpatentable over Herzog et al. (U.S. 4,669,903) in view of Wang (U.S. 5,334,976) and Christopher et al. (U.S. 4,075,679).

### **Grouping of Claims**

Claims 1-6, 9-19, 21-25, 27 and 28 stand together with respect to all rejections.

### **Argument**

**Issue: Whether the Examiner erred in rejecting claims 1-6, 9-19, 21-25, 27 and 28 under 35 U.S.C. 103(a) as being unpatentable over Herzog et al. (U.S. 4,669,903) in view of Wang (U.S. 5,334,976) and Christopher et al. (U.S. 4,075,679).**

A claimed invention is not patentable “if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art.” 35 U.S.C. § 103(a) (1994). The ultimate decision on obviousness is a “legal conclusion based on underlying factual inquiries including: (1) the scope and content of the prior art; (2) the level of ordinary skill in the art; (3) the differences between the claimed invention and the prior art; and (4) objective evidence of nonobviousness.” *In re Huang*, 40 USPQ2d 1685, 1687-88, 100 F.3d 135, 138 (Fed. Cir. 1996) (citing *Graham v. John Deere Co.*, 148 USPQ 459, 467, 383 U.S. 1, 17-18 (1966)).

The Federal Circuit has stated that “[i]n order to render a claimed apparatus or method obvious, the prior art must enable one skilled in the art to make and use the apparatus or method.” *Motorola Inc. v. Interdigital Technology Corp.*, 43 USPQ2d 1481, 1489, 121 F.3d 1461, 1471 (Fed. Cir. 1997) (quoting *Beckman Instruments, Inc. v. LKB Produkter AB*, 13 USPQ2d, 1301, 1304, 892 F.2d 1547, 1551 (Fed. Cir. 1989)). The Examiner’s rationale for rejecting claims 1-6, 9-19, 21-25, 27 and 28 under 35 U.S.C.

103(a) as allegedly unpatentable over Herzog et al., in view of Wang and Christopher et al., was stated in his final rejection as follows:

Herzog et al. teaches an input apparatus having substantially the structure as claimed. Herzog et al. teaches a keyboard having a plurality of keys which generate input signals including a plurality of numerals and letters of English alphabet as shown in Figs. 1 and 2 of Herzog et al. Herzog et al. fails to state or teach clearly the vertical and horizontal spacing between the input keys. However, Wang teaches an input apparatus having a plurality of keys in which a minimum center-to-center horizontal spacing in the range of 12-19 mm and a vertical spacing of 18-21 mm for the keys such as Shift, Control and Alter (Wang, the paragraph bridging cols. 4 and 5 and col. 5 second paragraph). Note that the spacing is obviously smaller for the alphanumeric keys 26-28 as shown in Fig. 1 of Wang. Note also that the widths and depths of the keys of a standard keyboard is about 12 mm which are also in the range as claimed. Christopher et al. teaches a keyboard having a full complement of alphanumeric keys and function keys as shown in the Figure (Front page). In view of the teachings of Wang and Christopher et al., it would have been obvious to one of ordinary skill in the art to modify the keyboard of Herzog et al. by providing the minimum center-to-center horizontal and vertical spacings between the input keys as taught by Wang and Christopher et al. for convenience of typing. With respect to claims 1,21,22,and 27, the selection of a desired keystroke travel range involves only an obvious matter of design choice based upon obvious experimentation. This obviousness is evidenced by the fact that Appellant recognizes that the conventional keystroke travel range is about 1.5-6 mm (the specification, page 10 lines 20-24). With respect to claims 6,14,18, and 25, each of the patents to Wang and Christopher et al. teaches a plurality of keys having the functions as recited.

Final Office Action, mailed October 18, 2002, at page 3.

**A. The Examiner has not established a *prima facie* case of obviousness.**

To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Third, the prior art reference (or references when combined) must teach or suggest all the claim limitations. MPEP § 706.02(j). The teaching or

suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art and can not be based on Appellant's disclosure. *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991).

Appellant respectfully asserts that a *prima facie* case of obviousness has not yet been established. The references cited by the Examiner do not provide any suggestion or motivation to modify or combine the references. Additionally, there is no reasonable expectation of successfully combining the references, as they teach away from their combination. Moreover, the references, when combined, do not teach or suggest all of the claim limitations.

1. The references, alone or in combination, do not teach or suggest all of the claim limitations.

A. *Herzog et al. (U.S. Patent No. 4,669,903)*

As described above, Appellant's invention provides a keyboard that allows for young children and adolescents or adults having small hands to learn to type and otherwise input data into a computer while minimizing the risk of injury to their hands (Specification at page 8, lines 1-15). As described and claimed, Appellant's invention provides a fixed key input apparatus comprising keys with a size and relative spacing that ranges from 60 to 86% of the ANSI/NFS standard (Specification at page 5, lines 3-20). This is described in independent claims 1 and 23 as a fixed key input apparatus comprising a plurality of keys to generate input signals corresponding to each letter of an alphabet wherein the keys are arranged with a horizontal key spacing, centerline to centerline, of 10.8 to 16.4 millimeters, a vertical key spacing, centerline to centerline, of 10.8 to 18.0 millimeters, an individual key width of 7.2 to 13 millimeters, an individual key depth of 7.2 to 15 millimeters, and the keystroke travel range of the keys is about 0.9 to 6 millimeters, whereby the fixed key input apparatus is sized accordingly for use by a person with smaller than average hands. Claim 23 adds the additional limitations that the keyboard is capable of generating input signals corresponding to each arabic numeral 0 to 9; generating input signals corresponding to a function to be undertaken wherein said function comprises: shift, return, control, alt, tab, caps lock, home, end, page up, page down, clear, scroll lock, up, down, left, right, backspace, delete, number lock (num lock),

enter, print screen, pause, escape (esc), option, or combinations thereof; and generating input signals corresponding to symbols wherein said symbols comprise: ` , ~ , ! , @ , # , \$ , % , ^ , & , \* , ( , ) , \_ , - , + , = , \ , | , ] , } , { , [ , : , ; , " , ' , " , ' , < , > , . , ? , or / .

The primary reference cited by the Examiner, Herzog et al. (U.S. 4,669,903), does not anywhere describe a keyboard input apparatus having small keys and/or a reduced relative spacing between the keys. In fact, Herzog et al. is concerned with *increasing* the spacing between keys. Herzog et al. (U.S. 4,669,903) teaches a keyboard that is designed to allow a user to place the left and right hands with their respective elbows pointing away from the midline of the keyboard (Herzog et al., Figures 1 and 2). Thus, the keyboard of Herzog et al., is divided into a left sector and a right sector, with the columns of keys in the left and right sector structured in a diagonal descending away from the midline, to allow the hands to be placed on the keyboard such that the hands are aligned outwardly with respect to the midline of the keyboard (Herzog et al., at col. 4, lines 11-16). With each descending row (*i.e.*, from the top to the bottom of the keyboard), the distance between the keys in the right sector and the left sector increases (Herzog et al., Figure 1; and col. 4, lines 27-47). In the layout described by Herzog et al., the angle of the left hand is equal and opposite to the angle of the right hand (Herzog et al., col. 4, lines 11-19).

Herzog et al. is silent with respect to the actual size of the keys. Herzog et al. does describe a Qwerty keyboard (Figure 1) and addresses problems of left hand misalignment that can result due to the layout of a conventional keyboard (Herzog et al., at col. 2, lines 41-59). Still, Appellant respectfully asserts that Herzog teaches away from Appellant's invention. Instead of teaching the use of keys that are closer together, Herzog recites a keyboard with a space in the middle of the keyboard, actually spreading keys on the left side from the keys on the right. Thus, there is nothing in Herzog et al., which teaches or suggests a keyboard designed for finger activated input using smaller than average hands.

*B. Wang (U.S. Patent No. 5,334,976)*

The second reference cited by the Examiner, U.S. Patent No. 5,334,976 to Wang, does not remedy the deficiencies of Herzog et al. The Examiner asserted that "Wang



teaches an input apparatus having a plurality of keys in which a minimum center-to-center horizontal spacing in the range of 12-19 mm and a vertical spacing of 18-21 mm for the keys such as Shift, Control, and Alter (Wang, the paragraph bridging cols. 4 and 5 and col. 5 second paragraph).” Final Office Action, mailed October 18, 2002, at page 3. Thus, it would appear that the Examiner is citing Wang as teaching at least some of the ranges of key spacing described and claimed in Appellant’s application.

In addressing the issue of range limitations, the Court of Customs and Patent Appeals has stated that a prima facie case of obviousness can be rebutted if the applicant (1) can establish “the existence of unexpected properties in the range claimed,” or (2) can show that the art in any material respect taught away” from the claimed invention. *In re Malagari*, 182 USPQ 549, 553, 499 F.2d 1297, 1303 (CCPA 1974). A prior art reference must be considered in its entirety; i.e., as a whole, including portions that would lead away from the claimed invention. *W.L. Gore & Associates, Inc. v. Garlock, Inc.*, 721 F.2d 1540, 220 USPQ 303 (Fed. Cir. 1983), *cert. denied*, 469 U.S. 851 (1984). Appellant respectfully asserts that Wang, *as a whole*, teaches away from the input apparatus as described and claimed in Appellant’s present application.

Wang describes a keyboard having two types of keys: (1) keys that are smaller in size and spacing than standard sized keys and that are activated by a stylus; and (2) keys that are of standard size and spacing and that are activated by the user’s fingers (Wang at col. 2, lines 24-38). Wang teaches a keyboard having a majority of the keys as stylus-activated keys that are reduced in size and spacing, and that are used in conjunction with finger-activated keys of normal size and/or spacing. Thus, Wang is primarily concerned a keyboard having a majority of the keys being activated by a stylus. In fact, the only keys that are not stylus-activated are those keys that are typically used in combination with another key, such that finger activation of the function is more efficient. The finger-sized keys are preferably keys such as SHIFT, CONTROL, ALTERNATE, COMMAND, AND CANCEL keys which require two-handed double and triple simultaneous keystrokes for the required inputs and commands (Wang, col. 2, lines 42-49). Nowhere, however, does Wang describe, teach, or suggest keys that are smaller in size and spacing for use by smaller than average hands.

Moreover, Appellant respectfully asserts that the ranges for key size and spacing taught by Wang do *not* overlap the ranges described and claimed by Appellant. The Examiner asserted that “Wang teaches an input apparatus having a plurality of keys in which a minimum center-to-center horizontal spacing in the range of 12-19 mm and a vertical spacing of 18-21 mm for the keys such as Shift, Control, and Alter (Wang, the paragraph bridging cols. 4 and 5 and col. 5 second paragraph).” Final Office Action, mailed October 18, 2002, at page 3. Appellant respectfully asserts, however, that the Examiner has misconstrued the teachings of Wang. The section cited by the Examiner actually states that “[t]he horizontal center-to-center dimensions between the Shift keys 12 and 14 and the Ctrl key 16, and the Ctrl key 16 and the Alt key 18, *are at least greater than* a value between the range of 12 mm (0.47 in) and 19 mm (0.75 in). The vertical center-to-center dimension between the finger-actuable Shift key 14 and the Enter key 22 *is at least greater than a value between the range of 18 mm (0.71 in) and 21 mm (0.83 in)*. Both of the horizontal and vertical ranges of center-to-center dimensions conform to the aforementioned human factors recommendations.” Wang at col. 4, lines 57-68, emphasis added. A vertical center-to-center distance of at least greater than 18 and 21 mm is outside of the range described and claimed by Appellant (a vertical spacing of 10.8 *up to* 18 mm) (emphasis added). Clearly, for finger actuated keys, Wang’s ranges for vertical spacing of the keys do not overlap the ranges described by Appellant.

Wang describes that *in conformance with conventional human factors specifications*, the finger-actuated keys may have a spacing between 12 and 21 mm (Wang, at col. 2, lines 59-64), and a key size ranging from 100 to 162 square mm (Wang at col. 3, line 44 to 49) to conform to the known standards set by the American National Standard for Human Factors Engineering of Visual Display Workstations (Wang at col. 4, lines 11-29). This does not teach the ranges for key sizes and spacings described by Appellant, however, because the horizontal and vertical spacings are not distinguished. Instead, these passages merely emphasize that the finger activated keys of Wang comprise a size and spacing that is in conformance with conventional human factors specifications.

The Examiner also asserted that “[w]hile the keyboard of Wang is used with a stylus for comfortably operating the keyboard, one [of] ordinary skill in the art would

recognize that the keyboard of Wang can be operated by users' fingers since the smallest key 108 (Wang, Fig. 4f) has a dimension of 10.64 mm x 8.26 mm." Office Action mailed October 18, 2002, Response to Arguments, at page 4. Appellant respectfully asserts that the Examiner's interpretation of this aspect of the teachings of Wang is also in error. In fact, the stylus activated keys of Wang have smaller size and spacing than the keys described in Appellant's application.

Thus, the description of the stylus-activated keys of Wang makes it explicit that these keys are *not* meant to be finger-activated. Wang states that "keys, such as alphabet keys 26, 27, 28, 30 and 31, Bk Sp (Back Space) key 32, Esc (Escape) key 34 and Go To key 36, all have keypad surfaces which are smaller than the previously mentioned finger-sized keys. These other keys are known as stylus-actuable keys and are intended for actuation by the operator using a conventional stylus 40." Wang at col. 4, lines 42-49. Wang goes on to describe that "the vertical distance between the four horizontal lines which pass through the centers of alphabet keys 26, 28 and 30, Ctrl key 16, Alt key 18, and Space key 20 are all 9.53 mm (0.375 in). The respective horizontal distances between vertical lines passing through alphabet keys 26, 28, 30 are 3.2 mm (0.126 in) and 6.35 mm (0.25 in)." (Wang at col. 6, lines 41-47). These distances, a vertical key spacing of 9.53 mm, and a horizontal key spacing of 3.2 and 6.35 mm are well below the ranges that can be activated by a finger (even the finger of a 3 to 4 year old) as described and claimed by Applicant.

Wang notes that in some configurations, the use of smaller stylus-activated keys may reduce the spacing between finger-activated keys. Wang teaches, however, that if one dimension is shortened, the other dimensions must be enlarged to keep the proper spacing for hand operation (Wang at col. 5, lines 1-5). Thus, Wang teaches that "if the keypad area of the Esc key 34 were less than 100 sq mm (0.16 sq in), it could be a finger-actuable key if either the horizontal or vertical center-to-center dimensions to the adjacent keys were greater than 12 mm (0.47 in) and 18 mm (0.71 in) respectively." (Wang at col. 5, lines 23-28). Thus, Wang does not teach a keyboard having both key size and key spacing reduced for use by a person with smaller than average hands.

Furthermore, a person with small hands would have difficulty utilizing all of the keys on the Wang keyboard. First, as described above, the stylus actuable keys have a

spacing range well below the range described and claimed by Appellant. The size and spacing for these keys corresponds to activation by a stylus, not small fingers. In fact, by employing a stylus, Wang suggests that the keys are too small for use by a human hand. Wang does not suggest that the keys meant for a stylus may be actuated by human fingers as asserted by the Examiner. Wang states “[t]hese other keys are known as stylus-actuable keys and are intended for actuation by the operator using a conventional stylus” (Wang at col. 4, lines 46-49). Clearly, Wang’s intention is to provide smaller keys for stylus actuation. Thus, one of ordinary skill in the art would recognize that using a human hand instead of a stylus goes against the intention of Wang. Second, the conventional sized keys of Wang are too large and spaced too far apart for use by a smaller hand.

The spacing of the keys as described and claimed in Appellant’s application selects dimensions to accommodate for the use of smaller than average human hands. The stylus actuated keys and even the conventional keys of Wang do not provide for a keyboard ergonomically designed for use by a person with smaller hands. Simply limiting the size of a few keys does not enable a person with smaller hands easier use of the apparatus. Wang teaches that should a dimension be smaller, other dimensions must remain according to the standards. These proportions are not adjusted for or account for small human hands. Changing the size of a key to allowing for striking by a stylus does not translate into a keyboard proportioned for operation by smaller hands.

Thus, Appellant respectfully asserts that Wang does not teach, suggest, or describe keys wherein the keys on the keyboard is designed to provide layout ranging from 60 to 86% of the ANSI/HFS 100-1988 standard key spacing for use by a person with smaller than average hands as is described by Appellant. In fact, Wang teaches away from using finger-activated keys that have smaller size and/or spacing that the conventional specifications, but instead suggests the use of a stylus for these smaller keys.

*Christopher et al. (U.S. Patent No. 4,075,679)*

Christopher et al. offers nothing additional to Wang and Herzog et al. Christopher et al. recites only a keyboard input including a group of numeric data keys

for entering data into a calculator, a group of algebraic operator keys for use in entering algebraic statements into the calculator, a second set of numeric keys, a complete set of alphabetic keys and a group of special character keys all arranged in a configuration slightly modified from that of a typewriter keyboard, a group of program editing and display control keys useful in editing displayed lines of alphanumeric information, a group of system command keys for listing programs of alphanumeric statements stored in the calculator memory, for controlling the operation of the magnetic tape cassette reading and recording unit, for controlling the calculator memory, and for otherwise controlling operation of the calculator, and a group of user definable keys (Christopher et al., at col. 3, line 55 to col. 4, line 2). This keyboard layout neither suggests nor teaches a keyboard adapted for people having small hands. Thus, Appellant respectfully asserts that the contribution of this reference is negligible.

2. There is no teaching or motivation, either in the references themselves or in the knowledge generally available, to modify or combine the references in a way as to describe the Appellant's invention, nor any suggestion that such a combination would be successful.

In determining the propriety of the Patent Office case for obviousness in the first instance, it is necessary to ascertain whether or not the reference teachings would appear to be sufficient for one of ordinary skill in the relevant art having the reference before him to make the proposed substitution, combination or other modification. *In re Linter*, 173 USPQ 560, 562, 458 F.2d 1013, 1016 (CCPA, 1972). The mere fact that references can be combined or modified does not render the resultant combination obvious unless the prior art also suggests the desirability of the combination. *In re Mills*, 916 F.2d 680, 682, 16 USPQ2d 1430, 1432 (Fed. Cir. 1990). The teaching or suggestion to make the claimed combination must be found in the prior art, not in Appellant's disclosure. *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991). There is no suggestion or motivation to combine Herzog et al. (U.S. 4,669,903) with Wang (U.S. 5,334,976) and/or Christopher et al. (U.S. 4,075,679) in a manner as to provide a keyboard having key sizes

and spacings suitable for use by a person with smaller than average hands, as is described and claimed by Appellant.

First, Herzog et al. and Wang address problems that are completely unrelated, both to each other, and to Appellant's invention. As described above, Herzog et al. is concerned with providing a keyboard to allow proper alignment of the arms and hands and to enable unobstructed movement of the fingers of the left and right hands. Thus, Herzog describes a keyboard having the keys positioned in a diagonal that extends outwardly away from the midline of the keyboard as the rows descend. Wang is concerned with the development of a keyboard allowing a maximum number of the keys to be activated by a stylus, so that the keyboard can be made smaller in size to allow for more room on the user's desktop. Furthermore, Christopher et al. adds nothing beyond a description of a keyboard having a full complement of algebraic and function keys. There is absolutely no evidence that these references are such that the skilled artisan would be motivated to combine the teachings of these references to result in keyboard having key sizes and spacings suitable for use by a person with smaller than average hands, as is described and claimed by Appellant.

Also, it is improper to combine references where the references teach away from their combination. MPEP § 2145; see also *In re Grasselli*, 218 USPQ 769, 779, 713 F.2d 731, 743 (Fed. Cir. 1983) As described above, both Herzog et al. and Wang teach away from each other, as Herzog et al. teaches a keyboard having increased spacing for proper hand placement on a key board, and Wang teaches keys that are closely spaced for stylus activation, rather than hand activation, of the keys. Thus, Appellant submits that a person of ordinary skill in the art would not be led or motivated to modify the disclosures in the cited references in order to reach the invention claimed in the present invention.

For at least reasons, Appellant respectfully asserts that the Examiner has been influenced by the Appellant's specification to engage in impermissible hindsight to combine the references. Even assuming *arguendo* that some teaching of each reference could be combined, one of ordinary skill in the art would not have been motivated to do so in the absence of Appellant's specification. Thus, Appellant respectfully asserts that the Examiner has not established a *prima facie* case of obviousness.

**B. Secondary considerations show that Appellant's invention is not obvious.**

The United State Supreme Court has held that “[u]nder § 103, the scope and content of the prior art are to be determined; differences between the prior art and the claims at issue are to be ascertained; and the level of ordinary skill in the pertinent art is resolved. Against this background, the obviousness or nonobviousness of the subject matter is determined. Such secondary considerations as commercial success, long felt but unsolved needs, failure of others, etc., might be utilized to give light to the circumstances surrounding the origin of the subject matter sought to be patented.” *Graham v. John Deere*, 383 US 1, 148 USPQ 459 (1966).

Appellant respectfully asserts that a keyboard having smaller key size and spacing that is specifically designed for use by a person with smaller than average hands was not described prior to Appellant's invention despite the need for such a product. For example, U.S. Patent No. 5,452,960 to Kuhlenschmidt, filed October 1994, and referenced by the Examiner in the Office Action mailed on August 22, 1996, can be used to show the nature of the art at the time of Appellant's invention.

Kuhlenschmidt describes a children's computer keyboard. In contrast to Appellant's invention, however, Kuhlenschmidt describes a keyboard having color-coded keys that are *enlarged* in size to promote recognition of the keys by children, and to increase tolerance for human error (Kuhlenschmidt, Abstract). Thus, Kuhlenschmidt shows the long-felt need that existed at the time of Applicant's invention for a children's keyboard. In addition, Kuhlenschmidt teaches that it was not obvious to develop a keyboard having keys of smaller size and spacing for children. In fact, reading Kuhlenschmidt, one would be surprised to find that a keyboard having keys of smaller size would provide a keyboard useful to teach data entry and touch typing to 3 and 4 year old children as is described by Appellant.

Also, the usefulness and commercial need for a keyboard designed for use by children has been recognized by those in the industry. Appellant attaches herewith as Appendix II, a copy of a letter dated June 2, 2003, from a marketing firm in the industry (Creative Group Marketing LLC) to the Appellant acknowledging the potential market for the small keyboard described in Appellant's related patent, U.S. Patent 5,531,229, filed January 26, 1995, which is also for a keyboard for children and adults having small

hands. [should we include?] A terminal disclaimer has been filed in the present application disclaiming any term beyond the term of U.S. Patent No. 5,531,229. This letter was received after the Appellant filed a Notice of Appeal on March 4, 2003, and thus, under 37 C.F.R. § 1.195, Appellant respectfully requests consideration of this document, as evidence of recognition by those in the industry of the long-felt need for Appellant's invention.

Thus, Appellant respectfully asserts that even if the Board finds that the Examiner has made a *prima facie* case of obviousness, secondary considerations teach that Appellant's invention was not obvious at the time of invention, and thus is not unpatentable under 35 U.S.C. § 103.

### Conclusion

In view of the foregoing, it is submitted that the rejection of claims 1-6, 9-19, 21-25, 27 and 28 under 35 U.S.C. § 103 is improper and should not be sustained. Therefore, a reversal of the Final Rejection of the Examiner is respectfully requested. Attached below is Appendix I listing claims 1-6, 9-19, 21-25, 27 and 28 as currently pending in the application.

This brief is being submitted in triplicate.

Respectfully submitted,

Date: 7/25/03

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**APPENDIX – Serial No. 08/612,969 Appealed Claims**

1. A fixed key input apparatus comprising a plurality of keys to generate input signals corresponding to each letter of an alphabet wherein the keys are arranged with a horizontal key spacing, centerline to centerline, of 10.8 to 16.4 millimeters, a vertical key spacing, centerline to centerline, of 10.8 to 18.0 millimeters, an individual key width of 7.2 to 13 millimeters, an individual key depth of 7.2 to 15 millimeters, and the keystroke travel range of said keys is about 0.9 to 6 millimeters, whereby the fixed key input apparatus is sized accordingly for use by a person with smaller than average hands.

2. The input apparatus of claim 1 wherein the alphabet is English and the input apparatus comprises a key for each letter of the alphabet.

3. The input apparatus of claim 1 further comprising keys to generate input signals corresponding to a plurality of numerals.

4. The input apparatus of claim 3 wherein the numerals are arabic numerals and the input apparatus comprises a key for each number 0 to 9.

5. The input apparatus of claim 1 further comprising a key or keys for generating signals corresponding to a function to be undertaken.

6. The input apparatus of claim 5 wherein the function to be undertaken comprises: shift, return, control, alt, tab, caps lock, home, end, page up, page down, clear, scroll lock, up, down, left, right, backspace, delete, number lock (num lock), enter, print screen, pause, escape (esc), option, or combinations thereof.

9. The input apparatus of claim 2 wherein the individual keys are arranged in a qwerty layout.

10. The input apparatus of claim 2 further comprising keys to generate input signals corresponding to a plurality of numerals.

11. The input apparatus of claim 10 wherein the numerals are arabic numerals and the input apparatus comprises a key for each number 0 to 9.

12. The input apparatus of claim 10 further comprising a key or keys for generating signals corresponding to a function to be undertaken.

13. The input apparatus of claim 11 further comprising a key or keys for generating signals corresponding to a function to be undertaken.

14. The input apparatus of claim 12 wherein the function to be undertaken comprises: shift, return, control, alt, tab, caps lock, home, end, page up, page down, clear, scroll lock, up, down, left, right, backspace, delete, number lock (num lock), enter, print screen, scroll lock, pause, escape (esc), option, or combinations thereof.

15. The input apparatus of claim 1 further comprising a key or keys for generating input signals corresponding to a symbol.

16. The input apparatus of claim 3 further comprising a key or keys for generating input signals corresponding to a symbol.

17. The input apparatus of claim 10 further comprising a key or keys for generating input signals corresponding to a symbol.

18. The input apparatus of claim 17 wherein the symbol comprises: ` , ~ , ! , @ , # , \$ , % , ^ , & , \* , ( , ) , \_ , - , + , = , \ , | , ] , } , { , [ , : , ; , " , ' , " , ' , < , > , . , ? , or / .

19. The input apparatus of claim 18 wherein the alphabetic keys are arranged in a qwerty layout.

21. The input apparatus of claim 1 wherein the keystroke travel range of said keys is 2 to 4 millimeters.

22. The input apparatus of claim 21 wherein the keystroke travel range of said keys is 1.2 to 3.44 millimeters.

23. An ergonomic input apparatus comprising a plurality of keys, said plurality:  
generating input signals corresponding to each letter of the English alphabet;  
generating input signals corresponding to each arabic numeral 0 to 9;  
generating input signals corresponding to a function to be undertaken wherein said function comprises: shift, return, control, alt, tab, caps lock, home, end, page up, page down, clear, scroll lock, up, down, left, right, backspace, delete, number lock (num lock), enter, print screen, pause, escape (esc), option, or combinations thereof; and  
generating input signals corresponding to symbols wherein said symbols comprise: ` , ~ , ! , @ , # , \$ , % , ^ , & , \* , ( , ) , \_ , - , + , = , \ , | , } , { , [ , : , ; , " , ' , , , < , > , . , ? , or / ;

wherein said keys generating input signals corresponding to each letter of the English alphabet are arranged in an array having a horizontal key spacing, centerline to centerline, between adjacent keys, of 10.8 to 16.4 millimeters, a vertical key spacing, centerline to centerline, between adjacent keys of 10.8 to 18.0 millimeters, an individual key width of 7.2 to 13 millimeters, an individual key depth of 7.2 to 15 millimeters; and  
wherein the keystroke travel range of said keys is about 0.9 to 6 millimeters;  
whereby the fixed key input apparatus is sized accordingly for use by a person with smaller than average hands.

24. The ergonomic input apparatus of claim 23 wherein the alphabetic keys are arranged in a qwerty layout.

25. The ergonomic input apparatus of claim 23 further comprising a plurality of function keys identified with the legend "F#" wherein # is an arabic numeral.

27. The ergonomic input apparatus of claim 24 wherein the keystroke travel range of said keys is 1.2 to 3.44 millimeters.

28. The input apparatus of claim 2 wherein the individual keys are arranged in a "Dvorak" layout.

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